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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/829,306	04/20/2004	Shinsuke Fujiwara	4685	5680

21553 7590 01/26/2006

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EXAMINER	
KANG, DONGHEE	
ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 01/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/829,306	FUJIWARA ET AL.	
	Examiner	Art Unit	
	Donghee Kang	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 November 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15 and 23-25* is/are pending in the application.

4a) Of the above claim(s) *2,7-10,14 and 15* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-6,11-13 and 23-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/10/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. Acknowledgment is made of receipt of applicant's Information Disclosure Statement (PTO-1449) field November 10, 2005.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims **1 & 25** are rejected under 35 U.S.C. 102(b) as being anticipated by Duggan et al. (US 5,747,827).

Duggan et al. teach a light emitting device of a II-VI group compound semiconductor formed on a compound semiconductor substrate and having an active layer between an n-type cladding layer and a p-type cladding layer, comprising (Fig.7):

An i-type semiconductor barrier layer (13) having a band gap larger than a band gap of said p-type cladding layer (4), provided between said active layer (2) and said p-type cladding layer, wherein said p-type cladding layer is disposed directly on said barrier layer. See also Col.4, lines 44-48.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims **1, 12 & 24** are rejected under 35 U.S.C. 103(a) as being unpatentable over Domen et al. (US 6,555,403) in view of Dugggan et al. (US 5,747,827).

Domen et al. teach a light emitting device of a III-V group compound semiconductor formed on a compound semiconductor substrate and having an active layer between an n-type cladding layer and a p-type cladding layer, comprising (Fig.38):

An i-type semiconductor barrier layer (626, Col.55, lines 5-7) having a band gap larger than a band gap of said p-type cladding layer (619), provided between said active layer (616) and said p-type cladding layer, wherein thickness of said barrier layer is at least 5 nm and at most thickness of said active layer, wherein said barrier layer is disposed directly on said active layer.

Domen et al. do not explicitly teach using II-VI group compound semiconductor material for making light emitting device. However, Domen et al. teach II-VI compound semiconductor material used for blue light emitting device (Col.1, lines 38-40) and also Duggan et al. teach that II-VI compound semiconductor material is used for blue light emitting device and III-V compound semiconductor material is alternatively used instead of II-VI compound (Col.5, lines 1-3). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the light emitting device using II-VI group material as taught by Domen since it is a known material well suited for blue light emitting device.

6. Claims **1, 3-4 & 23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Asryan et al. (US 6,870,178) in view of Domen et al. (US 6,555,403) & Dugggan et al. (US 5,747,827).

Re claim 1, Asryan et al. teach a light emitting device having an active layer between an n-type cladding layer and a p-type cladding layer, comprising (Fig.8):

A semiconductor barrier layer (804) having a band gap larger than a band gap of said p-type cladding layer (122), provided between said active layer (112) and said p-type cladding layer. Ayryan et al. do not teach the I-type barrier layer and the emitting device made of a II-VI group compound semiconductor. Domen et al. teach II-VI group compound semiconductor is used for light emitting device (Col.1, lines 38-49) and an i-type barrier layer (Col.55, lines 5-7). Duggan et al. also teach that II-VI compound semiconductor material is used for blue light emitting device and III-V compound semiconductor material is alternatively used instead of II-VI compound (Col.5, lines 1-3). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the light emitting device using II-VI group material as taught by Domen & Duggan since it is a known material well suited for blue light emitting device.

Re claim 3, Asryan et al. teach magnitude of the band gap of said barrier layer is larger by 0.05 eV than the band gap of said p-type cladding layer (See Table I on Col.13).

Re claim 4, Asryan et al. teach in the band gap of said barrier layer, energy of valence band is higher than that of said p-type cladding layer, and energy of conductive band is larger than that of said p-type cladding layer.

Re claim 23, Asryan et al. teach said barrier layer is a single monolayer interposed between said active layer and said p-type cladding layer.

7. Claims **1, 5-6 &11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Migita et al. (US 5,299,217) in view of Domen et al. (Us 6,555,403).

Re claims 1 & 11, Migita et al. teach in Fig.7 a light emitting device of a II-VI group compound semiconductor formed on a compound semiconductor substrate and having an active layer (22) between an n-type cladding layer (21) and a p-type cladding layer (23), wherein said p-type cladding layer is formed of ZnCdS. Migita et al. do not teach an I-type barrier layer having a band gap larger than a band gap of said p-type cladding layer, provided between said active layer and said p-type cladding layer. Domen et al. teach the I-type barrier layer 626 provided between said active layer (616) and said p-type cladding layer (619) to prevent the overflow of the carrier from the active layer to p-type cladding layer (Col.13, lines 35-38 & Fig.38). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Domen into the Migita' s device since the barrier layer prevents the overflow the electrons from the active layer to p-type cladding layer hence increasing light emission efficiency.

Re claims 5-6, neither Migita nor Domen teaches said barrier layer is formed of ZnMgBeSe. It would have been obvious to one of ordinary skill in the art to form the barrier layer using ZnMgBeSe, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as matter of obvious design choice. In re Leshin, 125 USPQ 416.

8. Claim **13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Duggan et al. (US 5,747,827) in view of Iwata (US 5,475,700).

Duggan et al. teach n-GaAs substrate is used for substrate but n-ZnSe. Iwata teaches n-type GaAs, InP, GaP, ZnSe may be used for the semiconductor substrate for II-VI group compound semiconductor (Col.4, lines 8-12). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the n-GaAs of Duggan with n-ZnSe as taught by Iwata since GaAs and ZnSe are art recognized substrate material for II-VI group compound semiconductor.

Allowable Subject Matter

9. Claims 5-6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

10. Applicant's arguments filed 11-10-05 have been fully considered but they are not persuasive.

Applicant argues that in Duggan, there is not a clear band gap larger than the band gap of the p-type cladding layer. This is not convincing. Figure 7 clearly teach band gap (18) of barrier is larger than that of cladding layer.

Applicant argues that the superlattice region can only carry out its intended effect as a multi-layered region, which does not corresponding to or suggest a barrier layer as presently claimed. This is not convincing. The claimed limitation "barrier layer" does not means a structure of layer but it means a functions.

Applicant argues that in Duggan, the barrier layer is not i-type layer but rather a doped region, and especially p-type doped region. This is not convincing. There is no teaching the supperlattice 13 being a p-type doped.

Applicant argues that Domen et al. do not teach i-type barrier layer. This is not convincing. Domen et al. clearly teach i-type barrier layer (Col.55, lines 5-7).

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 571-272-1656. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Donghee Kang, Ph.D.
Primary Examiner
Art Unit 2811

dhkl